

EIA-820

ANNUAL REFINERY REPORT

INSTRUCTIONS

1. QUESTIONS?

If you have any questions about Form EIA-820 after reading the instructions, please contact the Form Manager at (202) 586-1795.

2. PURPOSE

The Energy Information Administration (EIA) Form EIA-820, "Annual Refinery Report," is used to collect data on current and projected capacities of all operable petroleum refineries. The data appear on EIA's website at www.eia.doe.gov and in numerous government publications.

3. WHO MUST SUBMIT

Form EIA-820 is mandatory pursuant to Section 13(b) of the Federal Energy Administration Act of 1974 (Public Law 93-275) and must be completed by all operating and idle petroleum refineries (including new refineries under construction) and refineries shutdown during the previous year, located in the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam and other U.S. possessions.

Section 9 explains the possible sanctions for failing to report.

4. WHEN TO SUBMIT

Form EIA-820 must be filed with the EIA by February 15th.

5. COPIES OF SURVEY FORMS, INSTRUCTIONS AND DEFINITIONS

Copies in portable document format (PDF) and spreadsheet format (XLS) are available on EIA's website at:

www.eia.doe.gov/oil_gas/petroleum/survey_forms/pet_survey_forms.html

You may also access the materials by following the steps below:

- Go to EIA's website at www.eia.doe.gov
- Click on *Petroleum*
- Click on *Petroleum Survey Forms* located in the *References* box on the right side of the page
- Select the materials you want.

Files must be saved to your personal computer. Data cannot be entered interactively on the website.

6. HOW TO COMPLETE THE SURVEY FORM

PART A. RESPONDENT IDENTIFICATION

- Enter the 10-digit EIA ID Number. If you do not have a number, submit your report leaving this field blank. EIA will advise you of the number.
- Insert an "X" in the resubmission box if you are correcting information previously reported. (See **Resubmission** section below.)
- Enter the name and mailing address of the reporting company.
- Enter the refinery or blending plant name.
- Enter the name, telephone number, fax number, and e-mail address of the person to contact concerning information shown on the report. The person listed should be the person most knowledgeable of the specific data reported.

Resubmission

A resubmission is required whenever an error greater than 5 percent of a previously reported value is discovered by a respondent or if requested by the EIA.

Enter only those data cells which are affected by the changes. You are not required to file a complete form when you resubmit.

PART B. SUBMISSION INFORMATION

This form may be submitted to the EIA by fax, e-mail, or secure file transfer. Should you choose to submit your data via e-mail or facsimile, we must advise you that e-mail and facsimile are insecure means of transmission because the data are not encrypted, and there is some possibility that your data could be compromised. You can also send your Excel files to EIA using a secure method of transmission: HTTPS. This is an industry standard method to send information over the web using secure, encrypted processes. (It is the same method that commercial companies communicate with customers when transacting business on the web.) To use this service, we recommend the use of Microsoft Internet Explorer 5.5 or later or Netscape 4.77 or later. Send your surveys using this secure method at: <https://idc.eia.doe.gov/upload/noticeoog.jsp>.

Fax completed forms to: **(202) 586-6323 or (202) 586-1076**

E-mail completed forms to: OOG.SURVEYS@eia.doe.gov

Explain any unusual or substantially different aspects of your reporting year's operations that affect the data reported (e.g., new processing units, major modifications or retirement of processing units, sale of refinery).

PART C. REFINERY ACTIVITY

Definitions of petroleum products and other terms are provided in Section 11. Please refer to these definitions before completing the survey form.

Report all quantities to the nearest whole number. See individual headings for correct units of measure. Shaded cells on the form are those in which data are not currently required to be reported.

Section 1: Fuel, Electricity, and Steam Purchased and Consumed at the Refinery

Report purchased natural gas, coal, electricity, and steam used as a fuel at the refinery last year. **Report purchased quantities only.** Exclude consumption by petrochemical facilities associated with the refinery.

Natural Gas (Code 105) - Report the volume of dry natural gas purchased and used as a fuel at the refinery to the **nearest whole number of million cubic feet**. Exclude natural gas used as feedstock for hydrogen production.

Coal (Code 109) - Report the volume of coal purchased and used as a fuel at the refinery to the nearest whole number of **thousand short tons**. Include coke from coal, but exclude coke derived from petroleum.

Report electricity and steam consumed at the refinery last year. **Report purchased quantities only.** Exclude consumption by petrochemical facilities associated with a refinery.

Electricity (Code 114) - Report purchased electricity to the nearest whole number of **million kilowatt-hours**. Exclude electricity produced at the refinery, including cogeneration.

Steam (Code 113) - Report purchased steam to the nearest whole number of **million pounds**.

Section 2: Refinery Receipts of Crude Oil by Method of Transportation

Report last year's receipts of crude oil by method of transportation in **thousand barrels** using the following criteria:

Report the last method of transportation used if the distance traveled via this mode is equal to or greater than 100 miles.

Examples:

If the refinery received crude oil that first traveled 5,000 miles by tanker and then traveled 105 miles by pipeline to the refinery, report *pipeline* as the method of transportation.

If the refinery received crude oil that first traveled 3,000 miles by tanker, then 500 miles by barge, then 50 miles by pipeline, and finally traveled 75 miles to the refinery by truck, report *barge* as the method of transportation.

Report the method which represents the greatest distance traveled if several methods of transportation are used and no single method is equal to or greater than 100 miles.

Example:

If the refinery received crude oil that first traveled 75 miles by tank car, then 70 miles by barge and finally travels 55 miles by truck to the refinery, report *tank car* as the method of transportation.

Total domestic crude oil receipts reported on the annual Form EIA-820 must equal the sum of last year's monthly submissions of Domestic Crude Oil Receipts (Code 010) reported on the Form EIA-810, "Monthly Refinery Report." Alaskan crude is domestic.

Total foreign crude oil receipts reported on the annual Form EIA-820 must equal the sum of last year's monthly submissions of Foreign Crude Oil Receipts (Code 020) reported on the Form EIA-810, "Monthly Refinery Report."

Section 3: Atmospheric Crude Oil Distillation Capacity

Current Year:

Report operable capacity as of **January 1, 2006** (Code 401) for atmospheric crude oil distillation units in **both barrels per calendar day and barrels per stream day**. Processing equipment upstream of the atmospheric distillation tower/furnace, such as preflash drums/towers, prefractionators and outboard flash towers, should be considered part of the atmospheric distillation unit for capacity reporting purposes. The barrels per calendar day capacity for atmospheric crude oil distillation reported on the annual Form EIA-820 and the monthly Form EIA-810, "Monthly Refinery Report" for January 1, 2006 **must match**.

Barrels per Calendar Day - This is your total rated capacity and is the amount of input that your distillation units can process under usual operating conditions during a year. The amount is expressed in terms of capacity during a 24-hour period and should be reduced to account for the following limitations that may delay, interrupt, or limit optimal productive performance during a year:

- the annualized reduction of stream day capacity to account for scheduled downtime due to such conditions as routine inspection, maintenance, repairs and turnaround, and for unscheduled downtime due to such conditions as mechanical problems, repairs, and slowdowns. These factors may only happen once over a period of years and should not be counted only in the year of occurrence.
- the capability of downstream processing units to absorb the output of crude oil processing facilities of a given refinery. No reduction is necessary for intermediate streams that are distributed to other than downstream facilities as part of a refinery's normal operation.
- the types and grades of inputs to be processed.
- the types and grades of products expected to be manufactured.
- the environmental constraints associated with refinery operations.

Barrels per Stream Day -This is your design capacity, also called the surge capacity. It represents the maximum number of barrels of input that your distillation unit(s) can process within a 24-hour period when running at full capacity without interruption under optimal crude and product slate conditions with no bottlenecks in the system or allowance for downtime. **Barrels per stream day capacity must be greater than barrels per calendar day capacity.**

Operable Capacity has two components, operating and idle capacity.

- **Operating Capacity** (Code 399) - the component of operable capacity in operation at the beginning of the year (January 1).
- **Idle Capacity** (Code 400) - the component of operable capacity not in operation and not under active repair, but capable of being placed in operation within 30 days; or capacity not in operation but under active repair which can be completed in 90 days.

Projections:

Projections of operable capacity for next year (Code 501) should include operating, idle, and **any additional capacities slated for completion as of January 1 of the next year.**

Comments:

Explain any unusual or substantially different aspects of your reporting year's operations that affect the data reported (e.g., new processing units, major modifications, or retirement of processing units, sale of refinery, etc.)

Section 4: Downstream Charge Capacity

This section requires reporting current and future capacities for every named type of unit in terms of barrels per stream day and also in terms of barrels per calendar day for some of the units.

Report in *barrels per calendar day* (see definition in Section 3), the operable charge capacity as of January 1 of this year of the following downstream processing units:

- fluid coking (includes flexicoking) (Code 404)
- delayed coking (Code 405)
- fresh feed catalytic cracking (Code 407)
- catalytic hydrocracking:
 - distillate (Code 439)
 - gas oil (Code 440)
 - residual (Code 441)

Barrels per calendar day capacity must be less than barrels per stream day capacity. Charge capacity for a processing facility is measured in terms of its liquid feed adjusted (for standard temperature and pressure) inputs (feed) capacity. **Do not include** hydrogen gas inputs.

Report in *barrels per stream day* (see definition in Section 3) the operable charge capacity of the downstream processing facilities listed on the survey form as of January 1 of this year and projections of operable charge capacity, including operating, idle,

and any **additional capacities slated for completion as of January 1 of the next year.** Charge capacity for a processing facility is measured in terms of its input (liquids feed) capacity.

For the Thermal Cracking category "Other" (Code 406), include gas oil.

For the Desulfurization Units (Codes 426, 420, 421, 422, 423, 424, 413, and 425), include capacity of all types of desulfurization technologies as well as those hydrotreating units which have functions besides desulfurization. Please include a short note in the **Comments Section** of the form the details of hydrotreating for other than desulfurization purposes.

For the Catalytic Reforming categories (Codes 430 and 431), report the capacity of low pressure (less than 225 pounds per square inch gauge (PSIG) measured at the outlet separator) and high pressure (equal to or greater than 225 PSIG) processing units.

In the case of Fuels Solvent Deasphalting (Code 432), include only units designed to remove asphalt from petroleum fractions intended for further processing into fuel-type products. Do not include lube solvent deasphalting capacity.

Section 5: Production Capacity

Report the **maximum** amount of product that can be produced in 24 hours from all processing facilities at the refinery for the products listed on the survey form. All products should be reported in barrels except for hydrogen and sulfur.

Projections of operable production capacity for next year should include operating, idle, and **any additional capacities slated for completion by January 1 of the next year.**

The following factors should be considered when reporting the capacities for the following products:

- **Alkylates** (Code 415) - Report the maximum amount of alkylates that can be produced from alkylation processes.
- **Aromatics** (Code 437) - Report the maximum amount of aromatics that can be produced from various separation processes after catalytic reforming.
- **Asphalt and Road Oil** (Code 931) - Report the maximum amount of asphalt and road oil that can be produced. Do not include unfinished oils under this classification.
- **Isobutane** (Code 615) - Report the maximum amount of isobutane (C4H10) that can be produced.
- **C5/C6 Isomerate** (Code 438) - Report the maximum amount of isomerate including isopentane (C5H12) and isohexane (C6H14) that can be produced.
- **Lubricants** (Code 854) - Report the maximum amount of base stocks, including white oil feedstock, that can be produced at the refinery. Associated lube plant production outside the refinery gate should not be included.

This capacity should include base stocks and process oils that have undergone some combination of distillation, solvent extraction, hydrocracking, severe hydrotreating, deasphalting, dewaxing or finishing.

- **Petroleum Coke-Marketable** (Code 021) - Report the maximum amount of marketable petroleum coke that can be produced from processing and upgrading facilities. Do not include catalyst petroleum coke. Report in **barrels**. There are 5 barrels per short ton.
- **Hydrogen** (Code 091) - Report the maximum amount of hydrogen that can be produced only by your refinery's hydrogen generation plant. Do not include the hydrogen that is generated by the catalytic reforming units producing reformate. Report quantities in **million cubic feet per day (MMcfd)**.
- **Sulfur** (Code 435) - Report the maximum total sulfur recovery capacity of the refinery. Report quantities in **short tons per day**.

Section 6: Storage Capacity

Report in **thousand barrels** both working and shell storage capacity located at the refinery for the products listed on the survey form as of January 1 of this year.

Working and Shell Storage Capacity are defined as:

Working Storage Capacity - the difference in volume between the maximum safe fill capacity and the quantity below which pump suction is ineffective (bottoms).

Shell Storage Capacity - the design capacity of a petroleum storage tank which is always greater than or equal to working storage capacity.

Aboveground and underground storage capacity must include railroad tank cars located on site.

Exclude any leased tankage at other facilities.

Gasoline Blending Components (Code 136) - Includes motor gasoline and aviation gasoline blending components.

Other Products (Code 333) - Includes ethane/ethylene, isobutane/isobutylene, pentanes plus, other hydrocarbons, hydrogen, unfinished oils, finished aviation gasoline, special naphthas, wax, petroleum coke, still gas, petrochemical feedstocks and miscellaneous products.

8. PROVISIONS REGARDING CONFIDENTIALITY OF INFORMATION

Information on operable atmospheric crude oil distillation capacity, downstream charge capacity, and production capacity reported on Form EIA-820 are not considered as confidential and will be publicly released in identifiable form. In addition to the use of the information by EIA for statistical purposes, the information may be used for any nonstatistical purposes such as administrative, regulatory, law enforcement, or adjudicatory purposes.

All other information reported on this form will be kept confidential and not disclosed to the public to the extent that it satisfies the criteria for exemption under the Freedom of Information Act (FOIA), 5 U.S.C. §552, the DOE regulations, 10 C.F.R. §1004.11, implementing the FOIA, and the Trade Secrets Act, 18 U.S.C. §1905. The Energy Information Administration (EIA) will protect

your information in accordance with its confidentiality and security policies and procedures.

The Federal Energy Administration Act requires the EIA to provide company-specific data to other Federal agencies when requested for official use. The information reported on this form may also be made available, upon request, to another component of the Department of Energy (DOE); to any Committee of Congress, the General Accounting Office, or other Federal agencies authorized by law to receive such information. A court of competent jurisdiction may obtain this information in response to an order. The information may be used for any nonstatistical purposes such as administrative, regulatory, law enforcement, or adjudicatory purposes.

Company specific data are also provided to other DOE offices for the purpose of examining specific petroleum operations in the context of emergency response planning and actual emergencies.

Disclosure limitation procedures are not applied to the statistical data published from this survey's information. Thus, there may be some statistics that are based on data from fewer than three respondents, or that are dominated by data from one or two large respondents. In these cases, it may be possible for a knowledgeable person to estimate the information reported by a specific respondent.

9. SANCTIONS

The timely submission of Form EIA-820 by those required to report is mandatory under Section 13(b) of the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended. Failure to respond may result in a civil penalty of not more than \$2,750 each day for each violation, or a fine of not more than \$5,000 for each willful violation.

The government may bring a civil action to prohibit reporting violations which may result in a temporary restraining order or a preliminary or permanent injunction without bond. In such civil action, the court may also issue mandatory injunctions commanding any person to comply with these reporting requirements.

10. FILING FORMS WITH THE FEDERAL GOVERNMENT AND ESTIMATED REPORTING BURDEN

Respondents are not required to file or reply to any Federal collection of information unless it has a valid OMB control number. Public reporting burden for this collection of information is estimated to average 2 hours and 18 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information including suggestions for reducing this burden to: Energy Information Administration, Statistics and Methods Group, EI-70, 1000 Independence Avenue, S.W., Washington, D.C. 20585; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

11. DEFINITIONS

The following definitions are extracted from the approved glossary of petroleum products and other terms. This glossary was revised as of May 2005.

Alkylate. The product of an alkylation reaction. It usually refers to the high octane product from alkylation units. This alkylate is used in blending high octane gasoline.

Alkylation. A refining process for chemically combining isobutane with olefin hydrocarbons (e.g., propylene, butylene) through the control of temperature and pressure in the presence of an acid catalyst, usually sulfuric acid or hydrofluoric acid. The product, alkylate, an isoparaffin, has high octane value and is blended with motor and aviation gasoline to improve the antiknock value of the fuel.

Aromatics. Hydrocarbons characterized by unsaturated ring structures of carbon atoms. Commercial petroleum aromatics are benzene, toluene, and xylene (BTX).

Asphalt. A dark-brown-to-black cement-like material containing bitumens as the predominant constituent obtained by petroleum processing; used primarily for road construction. It includes crude asphalt as well as the following finished products: cements, fluxes, the asphalt content of emulsions (exclusive of water), and petroleum distillates blended with asphalt to make cutback asphalts. *Note:* The conversion factor for asphalt is 5.5 barrels per short ton.

Atmospheric Crude Oil Distillation. The refining process of separating crude oil components at atmospheric pressure by heating to temperatures of about 600 degrees Fahrenheit to 750 degrees Fahrenheit (depending on the nature of the crude oil and desired products) and subsequent condensing of the fractions by cooling.

Barrel. A unit of volume equal to 42 U.S. gallons.

Blending Components. See **Motor Gasoline Blending Components**.

Butane (C₄H₁₀). A normally gaseous straight-chain or branch-chain hydrocarbon extracted from natural gas or refinery gas streams. It includes normal butane and refinery-grade butane and is designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial butane.

Normal Butane (C₄H₁₀). A normally gaseous straight-chain hydrocarbon that is a colorless paraffinic gas which boils at a temperature of 31.1 degrees Fahrenheit and is extracted from natural gas or refinery gas streams.

Butylene (C₄H₈). An olefinic hydrocarbon recovered from refinery processes.

Catalytic Cracking. The refining process of breaking down the larger, heavier, and more complex hydrocarbon molecules into simpler and lighter molecules. Catalytic cracking is accomplished by the use of a catalytic agent and is an effective process for increasing the yield of gasoline from crude oil. Catalytic cracking processes fresh feeds and recycled feeds.

Fresh Feeds. Crude oil or petroleum distillates which are being fed to processing units for the first time.

Recycled Feeds. Feeds that are continuously fed back for additional processing.

Catalytic Hydrocracking. A refining process that uses hydrogen and catalysts with relatively low temperatures and high pressures for converting middle boiling or residual material to high-octane gasoline, reformer charge stock, jet fuel, and/or high grade fuel oil. The process uses one or more catalysts, depending upon product output, and can handle high sulfur feedstocks without prior desulfurization.

Catalytic Hydrotreating. A refining process for treating petroleum fractions from atmospheric or vacuum distillation units (e.g., naphthas, middle distillates, reformer feeds, residual fuel oil, and heavy gas oil) and other petroleum (e.g., cat cracked naphtha, coker naphtha, gas oil, etc.) in the presence of catalysts and substantial quantities of hydrogen. Hydrotreating includes desulfurization, removal of substances (e.g., nitrogen compounds) that deactivate catalysts, conversion of olefins to paraffins to reduce gum formation in gasoline, and other processes to upgrade the quality of the fractions.

Catalytic Reforming. A refining process using controlled heat and pressure with catalysts to rearrange certain hydrocarbon molecules, thereby converting paraffinic and naphthenic type hydrocarbons (e.g., low-octane gasoline boiling range fractions) into petrochemical feedstocks and higher octane stocks suitable for blending into finished gasoline. Catalytic reforming is reported in two categories. They are:

Low Pressure. A processing unit operating at less than 225 pounds per square inch gauge (PSIG) measured at the outlet separator.

High Pressure. A processing unit operating at either equal to or greater than 225 pounds per square inch gauge (PSIG) measured at the outlet separator.

Charge Capacity. The input (feed) capacity of the refinery processing facilities.

Coal. A readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time.

Conventional Gasoline. See **Motor Gasoline (Finished)**.

Crude Oil. A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Depending upon the characteristics of the crude stream, it may also include:

Small amounts of hydrocarbons that exist in gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators and are subsequently commingled with the crude stream without being separately measured. Lease condensate recovered as a liquid from natural gas wells in lease or field separation facilities and later mixed into the crude stream is also included;

Small amounts of nonhydrocarbons produced from oil, such as sulfur and various metals;

Drip gases, and liquid hydrocarbons produced from tar sands, gilsonite, and oil shale.

Liquids produced at natural gas processing plants are excluded. Crude oil is refined to produce a wide array of petroleum products, including heating oils; gasoline, diesel and jet fuels; lubricants; asphalt; ethane, propane, and butane; and many other products used for their energy or chemical content.

Crude oil is considered as either domestic or foreign, according to the following:

Domestic. Crude oil produced in the United States, including Alaska or from its "outer continental shelf" as defined in 43 USC 1331.

Foreign. Crude oil produced outside the United States. Imported Athabasca hydrocarbons (tar sands from Canada) are included.

Crude Oil, Refinery Receipts. Receipts of domestic and foreign crude oil at a refinery. Includes all crude oil in transit except crude oil in transit by pipeline. Foreign crude oil is reported as a receipt only after entry through customs. Crude oil of foreign origin held in bonded storage is excluded.

Delayed Coking. A process by which heavier crude oil fractions can be thermally decomposed under conditions of elevated temperatures and pressure to produce a mixture of lighter oils and petroleum coke. The light oils can be processed further in other refinery units to meet product specifications. The coke can be used either as a fuel or in other applications such as the manufacturing of steel or aluminum.

Desulfurization. The removal of sulfur, as from molten metals, petroleum oil, or flue gases. Petroleum *desulfurization* is a process that removes sulfur and its compounds from various streams during the refining process. Desulfurization processes include catalytic hydrotreating and other chemical/physical processes such as adsorption. Desulfurization processes vary based on the type of stream treated (e.g. naphtha, distillate, heavy gas oil, etc.) and the amount of sulfur removed (e.g. sulfur reduction to 10 ppm). See **Catalytic Hydrotreating**.

Distillate Fuel Oil. A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.

Electricity (Purchased). Electricity purchased for refinery operations that is not produced within the refinery complex.

ETBE (Ethyl tertiary butyl ether) (CH₃)₃COC₂H₅. An oxygenate blend stock formed by the catalytic etherification of isobutylene with ethanol.

Flexicoking. A thermal cracking process which converts heavy hydrocarbons such as crude oil, tar sands bitumen, and distillation residues into light hydrocarbons. Feedstocks can be any pumpable hydrocarbons including those containing high

concentrations of sulfur and metals.

Fluid Coking. A thermal cracking process utilizing the fluidized-solids technique to remove carbon (coke) for continuous conversion of heavy, low-grade oils into lighter products.

Fresh Feed Input. Represents input of material (crude oil, unfinished oils, natural gas liquids, other hydrocarbons and oxygenates or finished products) to processing units at a refinery that is being processed (input) into a particular unit for the first time.

Examples:

- (1) Unfinished oils coming out of a crude oil distillation unit which are input into a catalytic cracking unit are considered fresh feed to the catalytic cracking unit.
- (2) Unfinished oils coming out of a catalytic cracking unit being looped back into the same catalytic cracking unit to be reprocessed are not considered fresh feed.

Fuel Ethanol (C₂H₅OH). An anhydrous denatured aliphatic alcohol intended for gasoline blending. See **Oxygenates**.

Fuels Solvent Deasphalting. A refining process for removing asphalt compounds from petroleum fractions, such as reduced crude oil. The recovered stream from this process is used to produce fuel products.

Gas Oil. A liquid petroleum distillate having a viscosity intermediate between that of kerosene and lubricating oil. It derives its name from having originally been used in the manufacture of illuminating gas. It is now used to produce distillate fuel oils and gasoline.

Gasoline Blending Components. Naphthas which will be used for blending or compounding into finished aviation or motor gasoline (e.g., straight-run gasoline, alkylate, reformate, benzene, toluene, and xylene). Excludes oxygenates (alcohols, ethers), butane, and pentanes plus.

Gross Input to Atmospheric Crude Oil Distillation Units. Total input to atmospheric crude oil distillation units. Includes all crude oil, lease condensate, natural gas plant liquids, unfinished oils, liquefied refinery gases, slop oils, and other liquid hydrocarbons produced from tar sands, gilsonite, and oil shale.

Heavy Gas Oil. Petroleum distillates with an approximate boiling range from 651 degrees Fahrenheit to 1000 degrees Fahrenheit.

Hydrogen. The lightest of all gases, occurring chiefly in combination with oxygen in water; exists also in acids, bases, alcohols, petroleum, and other hydrocarbons.

Idle Capacity. The component of operable capacity that is not in operation and not under active repair, but capable of being placed in operation within 30 days; and capacity not in operation but under active repair that can be completed within 90 days.

Imports. Receipts of crude oil and petroleum products into the 50 States and the District of Columbia from foreign countries, Puerto Rico, the Virgin Islands, and other U.S. possessions and territories.

Isobutane (C₄H₁₀). A normally gaseous branch-chain hydrocarbon. It is a colorless paraffinic gas that boils at a

temperature of 10.9 degrees Fahrenheit. It is extracted from natural gas or refinery gas streams.

Isohexane (C_6H_{14}). A saturated branch-chain hydrocarbon. It is a colorless liquid that boils at a temperature of 156.2 degrees Fahrenheit.

Isomerization. A refining process which alters the fundamental arrangement of atoms in the molecule without adding or removing anything from the original material. Used to convert normal butane into isobutane (C_4), an alkylation process feedstock, and normal pentane and hexane into isopentane (C_5) and isohexane (C_6), high-octane gasoline components.

Isopentane. See **Natural Gasoline and Isopentane.**

Kerosene. A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10 percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades recognized by ASTM Specification D 3699 as well as all other grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil. See **Kerosene-Type Jet Fuel.**

Kerosene-Type Jet Fuel. A kerosene-based product having a maximum distillation temperature of 400 degrees Fahrenheit at the 10 percent recovery point and a final maximum boiling point of 572 degrees Fahrenheit and meeting ASTM Specification D 1655 and Military Specifications MIL-T-5624P and MIL-T-83133D (Grades JP-5 and JP-8). It is used for commercial and military turbojet and turboprop aircraft engines.

Light Gas Oils. Liquid petroleum distillates heavier than naphtha, with an approximate boiling range from 401 degrees Fahrenheit to 650 degrees Fahrenheit.

Liquefied Petroleum Gases (LPG). A group of hydrocarbon-based gases derived from crude oil refining or natural gas fractionation. They include: ethane, ethylene, propane, propylene, normal butane, butylene, isobutane, and isobutylene.

For convenience of transportation, these gases are liquefied through pressurization.

Liquefied Refinery Gases (LRG). Liquefied petroleum gases fractionated from refinery or still gases. Through compression and/or refrigeration, they are retained in the liquid state. The reported categories are ethane/ethylene, propane/propylene, normal butane/butylene, and isobutane/isobutylene. Excludes still gas.

Lubricants. Substances used to reduce friction between bearing surfaces or as process materials either incorporated into other materials used as processing aids in the manufacture of other products, or used as carriers of other materials. Petroleum lubricants may be produced either from distillates or residues. Lubricants include all grades of lubricating oils from spindle oil to cylinder oil and those used in greases.

Methanol (CH_3OH). A light, volatile alcohol intended for gasoline blending. See **Oxygenates.**

Miscellaneous Products. Includes all finished products not classified elsewhere (e.g., petrolatum, lube refining byproducts (aromatic extracts and tars), absorption oils, ram-jet fuel,

petroleum rocket fuels, synthetic natural gas feedstocks, and specialty oils). Note: Beginning with January 2004 data, naphtha-type jet fuel is included in Miscellaneous Products.

Motor Gasoline (Finished). A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as defined in ASTM Specification D 4814 or Federal Specification VV-G-1690C, is characterized as having a boiling range of 122 degrees Fahrenheit to 158 degrees Fahrenheit at the 10 percent recovery point to 365 degrees Fahrenheit to 374 degrees Fahrenheit at the 90 percent recovery point. "Motor Gasoline" includes conventional gasoline; all types of oxygenated gasoline, including gasohol; and reformulated gasoline, but excludes aviation gasoline. Note: Volumetric data on blending components, such as oxygenates, are not counted in data on finished motor gasoline until the blending components are blended into the gasoline.

Conventional Gasoline. Finished motor gasoline not included in the reformulated gasoline category. Note: This category excludes reformulated gasoline blendstock for oxygenate blending (RBOB) as well as other blendstock.

Reformulated Gasoline. Finished gasoline formulated for use in motor vehicles, the composition and properties of which meet the requirements of the reformulated gasoline regulations promulgated by the U.S. Environmental Protection Agency under Section 211(k) of the Clean Air Act. It includes gasoline produced to meet or exceed emissions performance and benzene content standards of federal-program reformulated gasoline even though the gasoline may not meet all of the composition requirements (e.g. oxygen content) of federal-program reformulated gasoline. Reformulated gasoline excludes reformulated blendstock for oxygenate blending (RBOB) and gasoline treated as blendstock (GTAB). Historical reformulated gasoline statistics included Oxygenated Fuels Program Reformulated Gasoline (OPRG).

Motor Gasoline Blending Components. Naphthas (e.g., straight-run gasoline, alkylate, reformate, benzene, toluene, xylene) used for blending or compounding into finished motor gasoline. These components include reformulated gasoline blendstock for oxygenate blending (RBOB) but exclude oxygenates (alcohols, ethers), butane, and pentanes plus. Note: Oxygenates are reported as individual components and are included in the total for other hydrocarbons, hydrogens, and oxygenates.

MTBE (Methyl tertiary butyl ether) ($CH_3)_3COCH_3$. An ether intended for gasoline blending. See **Oxygenates.**

Naphtha. A generic term applied to a petroleum fraction with an approximate boiling range between 122 degrees Fahrenheit and 400 degrees Fahrenheit.

Natural Gas. A gaseous mixture of hydrocarbon compounds, the primary one being methane.

Natural Gasoline and Isopentane. A mixture of hydrocarbons, mostly pentanes and heavier, extracted from natural gas, that meets vapor pressure, end-point, and other specifications for natural gasoline set by the Gas Processors Association. Includes isopentane which is a saturated branch-chain

hydrocarbon, (C₅H₁₂), obtained by fractionation of natural gasoline or isomerization of normal pentane.

Normal Butane. See **Butane**.

Operable Capacity. The amount of capacity that, at the beginning of the period, is in operation; not in operation and not under active repair, but capable of being placed in operation within 30 days; or not in operation but under active repair that can be completed within 90 days. Operable capacity is the sum of the operating and idle capacity and is measured in barrels per calendar day or barrels per stream day.

Operating Capacity. The component of operable capacity that is in operation at the beginning of the period.

Other Hydrocarbons. Materials received by a refinery and consumed as a raw material. Includes hydrogen, coal tar derivatives, gilsonite, and natural gas received by the refinery for reforming into hydrogen. Natural gas to be used as fuel is excluded.

Other Oxygenates. Other aliphatic alcohols and aliphatic ethers intended for motor gasoline blending (e.g., isopropyl ether (IPE) or n-propanol).

Oxygenates. Substances which, when added to gasoline, increase the amount of oxygen in that gasoline blend. Fuel ethanol, methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), and methanol are common oxygenates.

Fuel Ethanol. Blends of up to 10 percent by volume anhydrous ethanol (200 proof) (commonly referred to as the "gasohol waiver").

Methanol. Blends of methanol and gasoline-grade tertiary butyl alcohol (GTBA) such that the total oxygen content does not exceed 3.5 percent by weight and the ratio of methanol to GTBA is less than or equal to 1. It is also specified that this blended fuel must meet ASTM volatility specifications (commonly referred to as the "ARCO" waiver).

Blends of up to 5.0 percent by volume methanol with a minimum of 2.5 percent by volume cosolvent alcohols having a carbon number of 4 or less (i.e., ethanol, propanol, butanol, and/or GTBA). The total oxygen must not exceed 3.7 percent by weight, and the blend must meet ASTM volatility specifications as well as phase separation and alcohol purity specifications (commonly referred to as the "DuPont" waiver).

MTBE (Methyl tertiary butyl ether). Blends up to 15.0 percent by volume MTBE which must meet the ASTM D4814 specifications. Blenders must take precautions that the blends are not used as base gasolines for other oxygenated blends (commonly referred to as the "Sun" waiver).

Petrochemical Feedstocks. Chemical feedstocks derived from petroleum principally for the manufacture of chemicals, synthetic rubber, and a variety of plastics. The categories reported are "Naphtha Less Than 401° F" and "Other Oils Equal To or Greater Than 401° F."

Petroleum Coke. A residue high in carbon content and low in hydrogen that is the final product of thermal decomposition in the condensation process in cracking. This product is reported as

marketable coke or catalyst coke. The conversion is 5 barrels (of 42 U.S. gallons each) per short ton. Coke from petroleum has a heating value of 6.024 million Btu per barrel.

Marketable Coke. Those grades of coke produced in delayed or fluid cokers which may be recovered as relatively pure carbon. This "green" coke may be sold as is or further purified by calcining.

Catalyst Coke. In many catalytic operations (e.g., catalytic cracking) carbon is deposited on the catalyst, thus deactivating the catalyst. The catalyst is reactivated by burning off the carbon, which is used as a fuel in the refining process. This carbon or coke is not recoverable in a concentrated form.

Pipeline (Petroleum). Crude oil and product pipelines used to transport crude oil and petroleum products respectively, (including interstate, intrastate, and intracompany pipelines) within the 50 States and the District of Columbia.

Production Capacity. The maximum amount of product that can be produced from processing facilities.

Propane (C₃H₈). A normally gaseous straight-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of - 43.67 degrees Fahrenheit. It is extracted from natural gas or refinery gas streams. It includes all products designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial propane and HD-5 propane.

Propylene (C₃H₆). An olefinic hydrocarbon recovered from refinery processes or petrochemical processes.

Refinery. An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and oxygenates.

Refinery Input, Crude Oil. Total crude oil (domestic plus foreign) input to crude oil distillation units and other refinery processing units (cokers, etc.).

Refinery Input, Total. The raw materials and intermediate materials processed at refineries to produce finished petroleum products. They include crude oil, products of natural gas processing plants, unfinished oils, other hydrocarbons and oxygenates, motor gasoline and aviation gasoline blending components and finished petroleum products.

Refinery Production. Petroleum products produced at a refinery or blending plant. Published production of these products equals refinery production minus refinery input. Negative production will occur when the amount of a product produced during the month is less than the amount of that same product that is reprocessed (input) or reclassified to become another product during the same month. Refinery production of unfinished oils, and motor and aviation gasoline blending components appear on a net basis under refinery input.

Reformulated Gasoline. See **Motor Gasoline (Finished)**.

Residual Fuel Oil. A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specifications D 396 and D 975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is

defined in Military Specification MIL-F-859E, including Amendment 2 (NATO Symbol F-770). It is used in steam-powered vessels in government service and inshore powerplants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

Residuum. Residue from crude oil after distilling off all but the heaviest components, with a boiling range greater than 1000 degrees Fahrenheit.

Road Oil. Any heavy petroleum oil, including residual asphaltic oil used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades from 0, the most liquid, to 5, the most viscous.

Shell Storage Capacity. The design capacity of a petroleum storage tank which is always greater than or equal to working storage capacity.

Steam (Purchased). Steam, purchased for use by a refinery, that was not generated from within the refinery complex.

Still Gas (Refinery Gas). Any form or mixture of gases produced in refineries by distillation, cracking, reforming, and other processes. The principal constituents are methane, ethane, ethylene, normal butane, butylene, propane, propylene, etc. Still gas is used as a refinery fuel and a petrochemical feedstock. The conversion factor is 6 million BTU's per fuel oil equivalent barrel.

Sulfur. A yellowish nonmetallic element, sometimes known as "brimstone." It is present at various levels of concentration in many fossil fuels whose combustion releases sulfur compounds that are considered harmful to the environment. Some of the most commonly used fossil fuels are categorized according to their sulfur content, with lower sulfur fuels usually selling at a higher price. *Note:* No. 2 Distillate fuel is currently reported as having either a 0.05 percent or lower sulfur level for on-highway vehicle use or a greater than 0.05 percent sulfur level for off-highway use, home heating oil, and commercial and industrial uses. Residual fuel, regardless of use, is classified as having either no more than 1 percent sulfur or greater than 1 percent sulfur. Coal is also classified as being low-sulfur at concentrations of 1 percent or less or high-sulfur at concentrations greater than 1 percent.

TAME (Tertiary amyl methyl ether) $(CH_3)_2(C_2H_5)COCH_3$. An oxygenate blend stock formed by the catalytic etherification of isoamylene with methanol.

Tanker and Barge. Vessels that transport crude oil or petroleum products. Data are reported for movements between PAD Districts; from a PAD District to the Panama Canal; or from the Panama Canal to a PAD District.

TBA (Tertiary butyl alcohol) $(CH_3)_3COH$. An alcohol primarily used as a chemical feedstock, a solvent or feedstock for isobutylene production for MTBE; produced as a co-product of propylene oxide production or by direct hydration of isobutylene.

Thermal Cracking. A refining process in which heat and pressure are used to break down, rearrange, or combine hydrocarbon molecules. Thermal cracking includes gas oil, visbreaking, fluid coking, delayed coking, and other thermal cracking processes (e.g., flexicoking). See individual categories for definition.

Unfinished Oils. All oils requiring further processing, except

those requiring only mechanical blending. Unfinished oils are produced by partial refining of crude oil and include naphthas and lighter oils, kerosene and light gas oils, heavy gas oils, and residuum.

United States. The United States is defined as the 50 States and the District of Columbia.

Vacuum Distillation. Distillation under reduced pressure (less than atmospheric) which lowers the boiling temperature of the liquid being distilled. This technique with its relatively low temperatures prevents cracking or decomposition of the charge stock.

Visbreaking. A thermal cracking process in which heavy atmospheric or vacuum-still bottoms are cracked at moderate temperatures to increase production of distillate products and reduce viscosity of the distillation residues.

Working Storage Capacity. The difference in volume between the maximum safe fill capacity and the quantity below which pump suction is ineffective (bottoms).